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Comparison of Radiation Exposure During Thoracolumbar Fusion Using Fluoroscopic Guidance versus Anatomic Placement of Pedicle Screws

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COMPARISON OF RADIATION EXPOSURE DURING THORACOLUMBAR FUSION USING FLUOROSCOPIC GUIDANCE VERSUS ANATOMIC PLACEMENT OF PEDICLE SCREWS

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Introduction:

There are multiple accepted surgical techniques for placing thoracolumbar pedicle screws. Some surgeons use fluoroscopy to aid in placement of instrumentation, while others use fluoroscopy as confirmation of positioning after anatomic placement of screws. The purpose of this study is to evaluate the difference in radiation exposure imparted to the patient using a fluoroscopic-guided technique versus anatomic placement of screws.

Methods:

A retrospective study evaluated 185 adult patients with non-percutaneous, posterior instrumented fusions over a four-year time period. For each patient, the fluoroscopy report was reviewed and the method of fluoroscopy utilization was ascertained from the patient's operative report. Average seconds per screw inserted for each method was compared using a student's t-test.

Results:

82 patients underwent thoracolumbar fusion by an anatomic technique, with an average of 5.72 screws (range 2-26) placed. The mean fluoroscopy time was 11.85 seconds (median 6 sec.) and the average time for placement of a single screw was 2.65 seconds. 103 patients underwent fluoroscopic-guided surgery. An average of 5.1 screws (range 2-12) were placed and the mean fluoroscopy time was 83.26 seconds per operation. The average time for placement of a single screw was 17.08 seconds.

Conclusion:

Patients undergoing thoracolumbar fusion using the fluoroscopic-guided technique have increased radiation exposure, reaching 6.5 times the amount imparted using an anatomic technique, which is statistically significant ($p<0.01$). Surgeons performing a large number of fluoroscopic-guided operations may have the potential to exceed annual radiation dose limits.